REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The present invention as set forth in **amended Claim 1** relates to a bonding composition for tooth tissue, comprising:

a mixture of **a (meth)acryloyloxyalkyl phosphate,**

a water-soluble film-forming agent,

a form-retaining agent selected from the group consisting of a sand balloon, a glass balloon, a glass fiber having a mean particle size between 1 and 300 micron, a piece of hollow glass fiber, a glass bead, glass powder, powder of a natural mineral, beads of a cross linked polymer, flakes of a cross linked polymer and an organic/inorganic composite material containing a cross linked polymer,

water, and

a curing agent;

wherein a calcium salt formed from said (meth)acryloyloxyalkyl phosphate is insoluble in water;

wherein said film-forming agent is a polymerizable compound; and

wherein said film-forming agent is miscible with a physiological saline solution.

The rejection of Claims 1-18 under 35 U.S.C. §103(a) as being unpatentable over Ikemura et al (US 5,264,513) in view of Hino et al (US 5,321,053), Tateosian et al (US 5,554,665), Qian (US 5,859,089) or Zeng et al (US 6,051,626), further in view of Sakuma et al (US 5,290,172), Roberts et al (US 5,883,153) or Jia (US 6,147,137) is respectfully

traversed.

None of the cited references or their combination disclose or suggest a bonding composition , comprising, *inter alia*, a combination of **1) a (meth)acryloyloxyalkyl phosphate, 2) a form-retaining agent selected from the group consisting of a sand balloon, a glass balloon, a glass fiber having a mean particle size between 1 and 300 micron, a piece of hollow glass fiber, a glass bead, glass powder, powder of a natural mineral, beads of a cross linked polymer, flakes of a cross linked polymer and an organic/inorganic composite material containing a cross linked polymer, and 3) water**.

However, this claimed combination results in superior properties of the claimed bonding composition as shown by Example 11 of the present invention. In Example 11, **10-methacryloyloxydecyl phosphate having a phosphoric acid group, a hollow borosilicate glass as form-retaining agent and water are** used and **a bonding strength of 20.7 MPa and a bonding durability of 18.6 MPa** is achieved. There is no suggestion in any of the references that such superior properties can be achieved using the claimed combination of ingredients in the bonding composition.

Ikemura et al disclose a primer composition which does not contain a form-retaining agent as required by the present invention. Ikemura et al fail to disclose or suggest to add a **form-retaining agent selected from the group consisting of a sand balloon, a glass balloon, a glass fiber having a mean particle size between 1 and 300 micron, a piece of hollow glass fiber, a glass bead, glass powder, powder of a natural mineral, beads of a cross linked polymer, flakes of a cross linked polymer and an organic/inorganic composite material containing a cross linked polymer,** to a bonding composition for the

purpose of having more increased bonding strength and more stable bonding durability. The form-retaining agent of the present invention gives the claimed bonding composition increased bonding strength and more stable bonding durability (see Examples 7 to 10, 11 to 15 etc. of the specification). This is neither disclosed nor suggested by this reference. Thus, the present invention is neither anticipated by nor obvious over Ikemura et al.

In addition, Hino et al; Tateosian et al; Qian and Zeng et al fail to disclose water in their compositions. Specifically, the dental composition of Hino et al, the adhesive composition for dental or surgical treatment of Zeng et al, the dental restorative compositions of Qian and the dental products of Tateosian et al **do not contain water** which is an ingredient of the present binding composition.

However, water helps ensuring the bonding ability (present application, page 14, lines 22 to 23). This is illustrated by a comparison of Example 5 and Comparative Example 11 in which water was omitted. In Example 5, a **bonding strength of 18.6 and a bonding durability of 15.8 MPa** was achieved. **When water is omitted**, the **bonding strength is only 9.0 and the bonding durability 3.6 MPa**. Thus, the bonding ability of the composition according to the present invention is clearly superior.

Furthermore, these references do not teach to add a form-retaining agent to a bonding composition for the purpose of having more increased bonding strength and more stable bonding durability.

(Meth)acryloyloxyalkyl phosphate is preferred for further improvement of the bonding strength and durability of the present bonding composition. This is illustrated by a comparison of Example 11 and Example 16 in which

4-methacryloyloxyethoxycarbonylphthalic acid which has a carbonyl group in the molecule instead of a phosphoric acid group is used. In Example 11, **10-methacryloyloxydecyl phosphate having a phosphoric acid group** is used and **a bonding strength of 20.7 MPa and a bonding durability of 18.6 MPa** is achieved. On the other hand, in Example 16, **4-methacryloyloxyethoxycarbonylphthalic acid having a carbonyl group** is used and the **bonding strength is only 16.7 MPa and the bonding durability is only 15.0 MPa**.

Sakuma et al (US 5,290,172) disclose a bonding material comprising a methacrylate or acrylate having at least one unsaturated double bond, a (thio)barbituric acid derivative and a polymerization initiator. However, Sakuma et al fail to disclose or suggest to add a **(meth)acryloyloxyalkyl phosphate and water** to a bonding composition for the purpose of having more increased bonding strength and more stable bonding durability.

Roberts et al (US 5,883,153) disclose a fluoride-ion sustained release preformed glass ionomer filler. They further disclose that this filler can be used in great many kinds of dental compositions. However, Roberts et al fail to disclose or suggest a combination of a **(meth)acryloyloxyalkyl phosphate, a water-soluble film-forming agent, water and the claimed specific form-retaining agent** for the purpose of having more increased bonding strength and more stable bonding durability.

Jia (US 6,147,137) disclose a primer/bonding composition for dental restorations comprising a photoinitiator system and a monomer system consisting essentially of at least one polymerizable acidic component and at least one hydrophilic monomer. However, all polymerizable acidic compounds listed at col. 2, line 66 to col. 3, line 14, of Jia are compounds having a **carboxyl group in the molecule**. There is no disclosure or suggestion

of **(meth)acryloyloxyalkyl phosphate** having a **phosphoric acid group in the molecule**.

Therefore, the rejection of Claims 1-18 under 35 U.S.C. §103(a) as being unpatentable over Ikemura et al (US 5,264,513) in view of Hino et al (US 5,321,053), Tateosian et al (US 5,554,665), Qian (US 5,859,089) or Zeng et al (US 6,051,626), further in view of Sakuma et al (US 5,290,172), Roberts et al (US 5,883,153) or Jia (US 6,147,137) is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

The rejection of Claims 20 and 26 under 35 U.S.C. §112, 2nd paragraph, is obviated by the cancellation of Claims 20 and the amendment of Claim 26. In Claim 26, the term "rapidly curable" was deleted.

Applicants will reply to the obviousness-type double patenting rejection once the Examiner has found the claims allowable over all other prior art of record.

Applicants respectfully request that the Examiner acknowledge that the references cited in the **Information Disclosure Statement**, filed in the above-identified application on **November 28, 2001**, have been considered. Applicants note that the Examiner initialed all U.S. patent documents but did not initial the foreign patent documents. For the Examiner's convenience a copy of Form PTO 1449 as filed on **November 28, 2001,** is attached herewith.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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Form PTO 1449 (Modified) | U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

LIST OF REFERENCES CITED BY APPLICANT

ATTY DOCKET NO.	SERIAL NO.
216450US0DIV	NEW APPLICATION
APPLICANT: Kenichi HINO	
FILING DATE: HEREWITH	

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	AA	5,264,513	11/23/93	Kunio IKEMURA, et al.			
	AB	4,719,149	01/12/88	Steven M. AASEN, et al.			
	AC	6,051,626	04/18/00	W. ZENG, et al.			
	AD	5,525,648	06/11/96	Steven M. AASEN, et al.			
	AE	5,321,053	06/14/94	HINO, et al.			
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						
	AL						
	AM						
	AN						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	TRANSLATION YES	TRANSLATION NO
	AO	WO 93/12760	07/08/93	WIPO (with corr. US 5,525,648)		
	AP	0 835 646	04/15/98	EUROPE (with corr. US 6,051,626)		
	AQ	2 332 911	07/07/99	GREAT BRITAIN		
	AR	3-240712	10/28/91	JAPAN (w/English Abstract)		x
	AS	62-223289	10/01/87	JAPAN (w/English Abstract)		x
	AT	60-45510	03/12/85	JAPAN (w/English Abstract)		x
	AU					
	AV					

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, etc.)

	AW	
	AX	
	AY	
	AZ	

Examiner	Date Considered

*Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.